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TROX® TECHNIK

**Solutions for Laboratory systems**
**TROX Labcontrol**
**TFM/TPM**

**PI/7.4/3/D/1**

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## 1. Areas of application

In highly sensitive areas like laboratories and hospitals, the top priority is protection of personnel. The complex requirements of these areas are fulfilled by ventilation systems. The monitoring and display of system parameters are indispensable here.

TROX's TFM/TPM product series comprises monitoring devices for both new buildings and those being renovated. They monitor the significant parameters of fume cupboards and check on the correct room pressures. They operate on the basis of a microprocessor which handles a programme for monitoring the protective function which cannot be lost. The system data is stored in the EEPROM which is effectively protected from power failure.

The TFM type monitors the volume flows of the supply/exhaust air or the air intake velocity (face velocity) at fume cupboards in accordance with DIN12924 or EN 14175-2. The TFM-1 has an internal transmitter of reliable long-term stability for differential pressure detection whilst the TFM-2, in contrast, has an analogue input for the volume flow actual value or air intake sensor connection. The TPM uses the analogue input to connect a room pressure transmitter or ring balance manometer.
Parameters are downloaded in an installed condition. Parameters are not downloaded at the works.
Depending on application, the condition of the fume cupboard or room pressure is indicated by the user terminal through an acoustic and visual alarm.

In case of an alarm there is both a visual display and an acoustic signal. A potential-free contact (change-over contact) allows an alarm message to be transferred to the GLT.

## 2. Functionality

Proper aerodynamic functioning of a fume cupboard must be monitored in accordance with EN 14175-2 (possibly with DIN12924 in the case of refurbishment of existing systems) by a fume cupboard function indicator. Given a fault, both a visual and acoustic alarm are to go off. It must be possible to turn off the acoustic alarm.
The TFM-1 and TFM-2 units are designed for these applications.

Room pressure control is frequently used in laboratory buildings with more extensive safety requirements. As the correct pressures cannot be felt, the user should be able to actually see the correct room pressure. The TPM is used to monitor the correct room pressures.

A distinction is made between 3 different unit types:

TFM-1: Monitoring fume cupboard through differential pressure measurement by means of a measuring rod (included in delivery) or volume flow meter (to be ordered separately) for establishing the volume flow actual values.

TFM-2: Monitoring fume cupboard with measurement recording through external actual value signal, for instance, by means of an on-site volume flow controller or a velocity sensor.
A velocity sensor can be obtained as an option.

TPM: Monitoring pressure-controlled rooms by means of an on-site or optional room pressure transmitter or a ring balance manometer.
A room pressure transmitter can be obtained as an option.

The following unit combinations are available:

1. TFM-1 (with internal transmitter)
2. TFM-2/TPM (with analogue input for test data recording)

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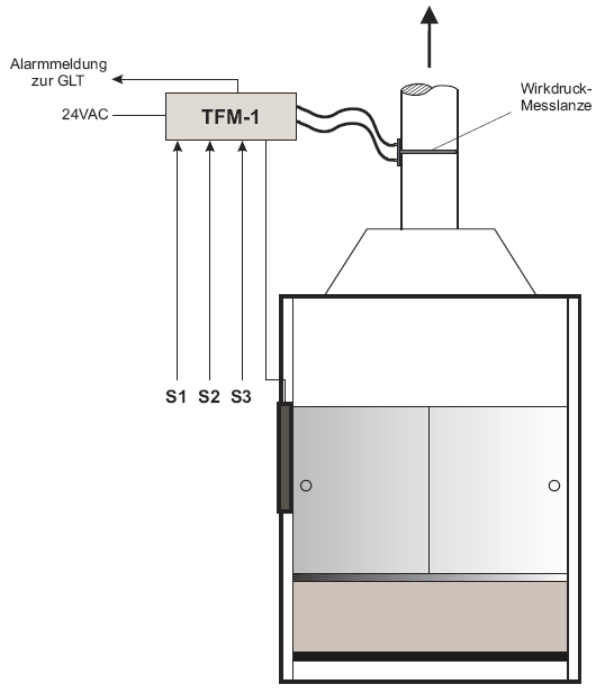
## 3. Overview of the most important functions

**TFM-1**

**TFM-1 Configuration**
**(Established by means of TROXMConnect user software):**

- Volume flow measurement by means of internal measuring point
- Taking pressure measurements by means of an internal measuring point. The volume flow is calculated using the formula ‡ = C x ((p, where C = unit constant and (p = measured differential pressure).
- 2 Monitoring values – configurable
- The following parameters can be individually selected for undercutting or exceeding both the monitoring values:
  – Alarm delay
  – Duration of the acoustic alarm or suppression
  – Transfer by means of the alarm relay yes/no
- Operating device selection (Standard or AF-1)
- Front slider > 500mm with visual alarm and optional acoustic alarm
- Front slider contact connection as opener or closer
- Monitoring function shutdown as opener or closer (e.g. for night-time operation)
- Standard capacitor buffer for displaying a power failure including charging connection
- Indication of service time (in association with AF-1)
- Lighting and sash window closer with optional AF-1 operating device – controllable
- Suitable for all fume cupboard types

**TFM-Functional diagram**




**Differential pressure measuring rod**

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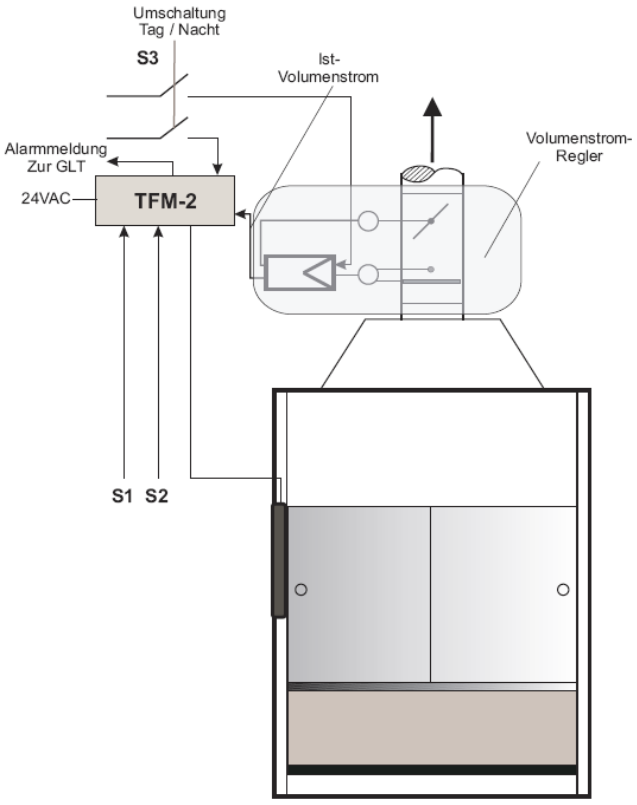
**TFM-2/TPM:**

**TFM-2 Configuration**
**(Established by means of TROXMConnect user software):**

- Volume flow measurement by means of external measurement point
  (analogue voltage signal)
- Taking pressure measurements by means of an external measuring point (analogue voltage signal). The volume flow is calculated using the formula ‡ = C x √Δp, where C = unit constant and Δp = measured differential pressure).
- Intake velocity (face velocity) with optional velocity transmitter
- 2 Monitoring values – configurable
- The following parameters can be individually selected for undercutting or exceeding both the monitoring values:
  – Alarm delay
  – Duration of the acoustic alarm or suppression
  – Transfer by means of the alarm relay yes/no
- Operating device selection (Standard or AF-1)
- Front slider > 500mm with visual alarm and optional acoustic alarm
- Front slider contact connection as opener or closer
- Monitoring function shutdown as opener or closer (e.g. for night-time operation)
- Standard capacitor buffer for displaying a power failure including charging connection
- Indication of service time (in association with AF-1)
- Lighting and sash window closer with optional AF-1 operating device – controllable
- Suitable for all fume cupboard types

**TFM-2 Functional diagram**



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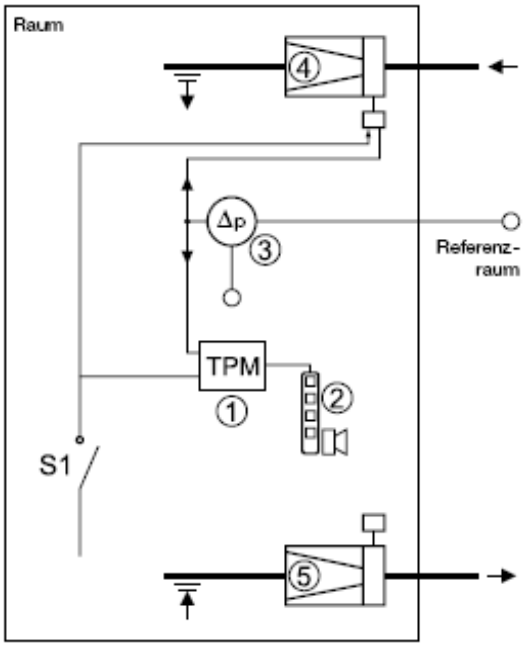
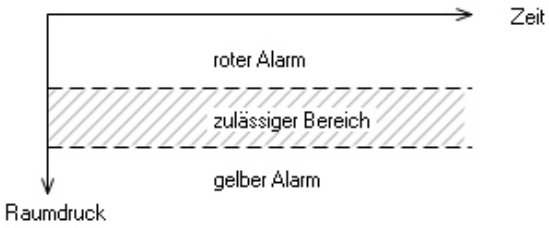
**TPM Configuration**

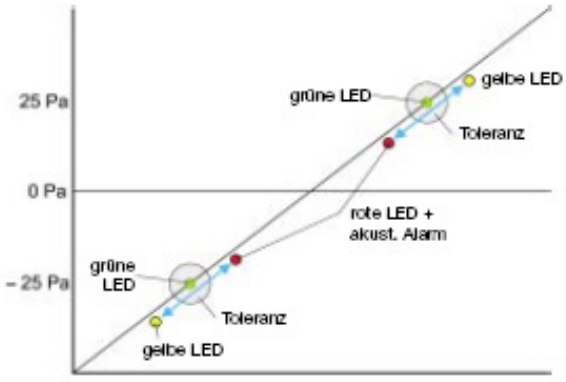
**(Established through TROXMConnect operating software):**

- Taking pressure measurements by means of an external measuring point (analogue voltage signal)
- All characteristic curves of pressure adapters can be configured
- 2 Monitoring values – configurable
- The following parameters can be individually selected for undercutting or exceeding both the monitoring values:
  – Alarm delay
  – Duration of the acoustic alarm or suppression
  – Transfer by means of the alarm relay yes/no
- Monitoring function shutdown as opener or closer (e.g. through door switch)
- Door switch as opener or closer
- Determinable alarm delay in the case of 'Door open'
- Standard capacitor buffer for displaying a power failure including charging connection




**Alarm states:**




1 TPM basic unit
2 TPM user terminal
3 Room pressure transmitter (on-site)
4 Volume flow controller – supply air
5 Volume flow controller – exhaust air
S1 Changeover room pressure set value
or deactivation of the monitoring function

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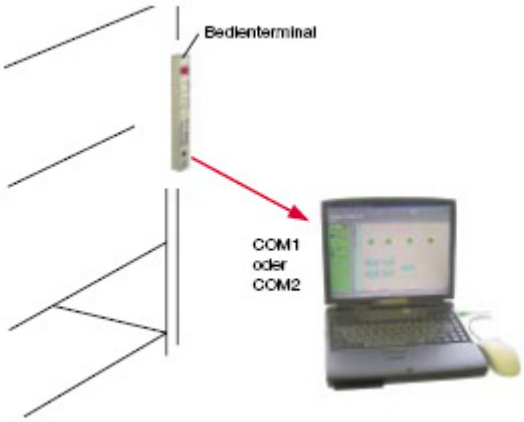
## 4. Down-load of parameters

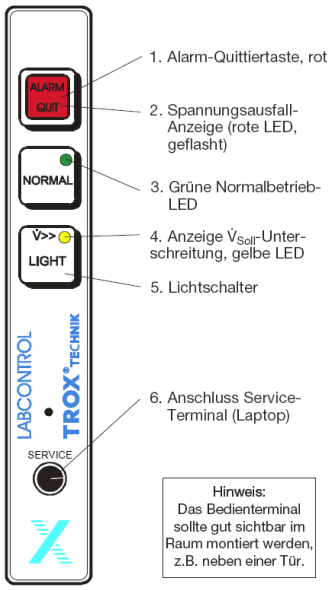
**TROXMConnect**
The TROXMConnect software is available for straightforward configuration of the monitoring device. With it data sets can be loaded and backed up. This is done so that databases can be created for documentation or for rapid commissioning.
All adjustment data can be clearly and quickly entered or read out. At the same time the displayed units (l/s or m3/h) can be freely selected.
The software can be switched to English, if desired. A setup programme simplifies the installation.
Along with unit type adjustment and current value display, the analogue input can be configured, the alarm situation established and the precise reason for the alarm can be enquired into easily and quickly using a diagnosis page. Following selection of the basic unit a wiring example is also available.

The precise instructions can be found in the user manual!

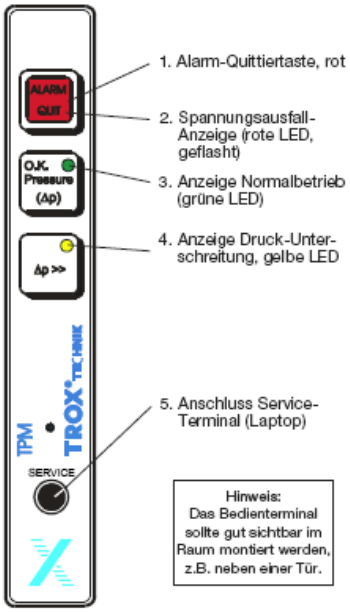



## 5. Standard user terminal

**TFM-1/TFM-2:**




**TPM:**



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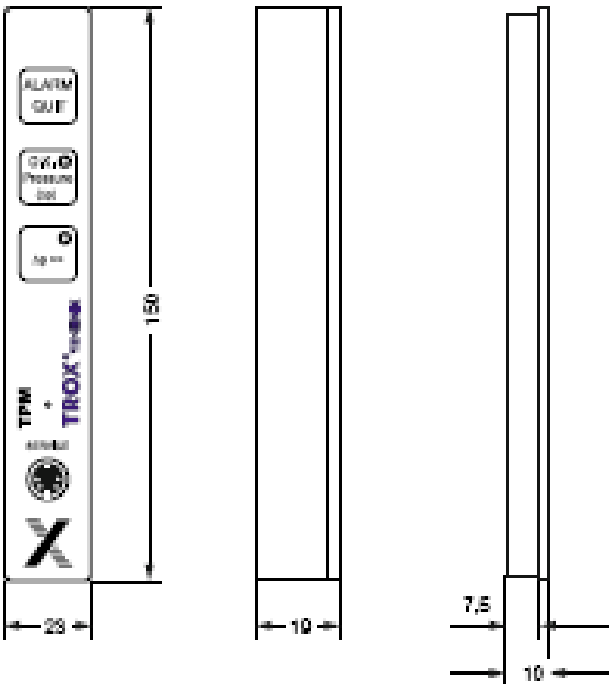
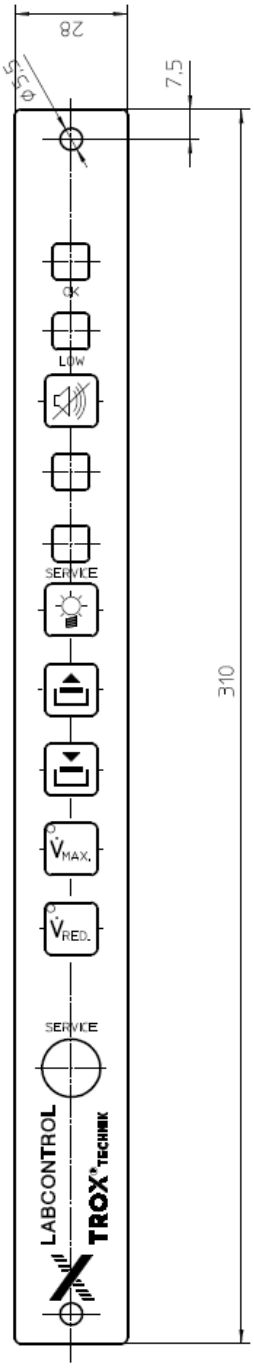
## User terminal dimensions
## Standard user terminal




## User terminal dimensions
## User terminal AF-1

**TFM-1/TFM-2 (optional):**



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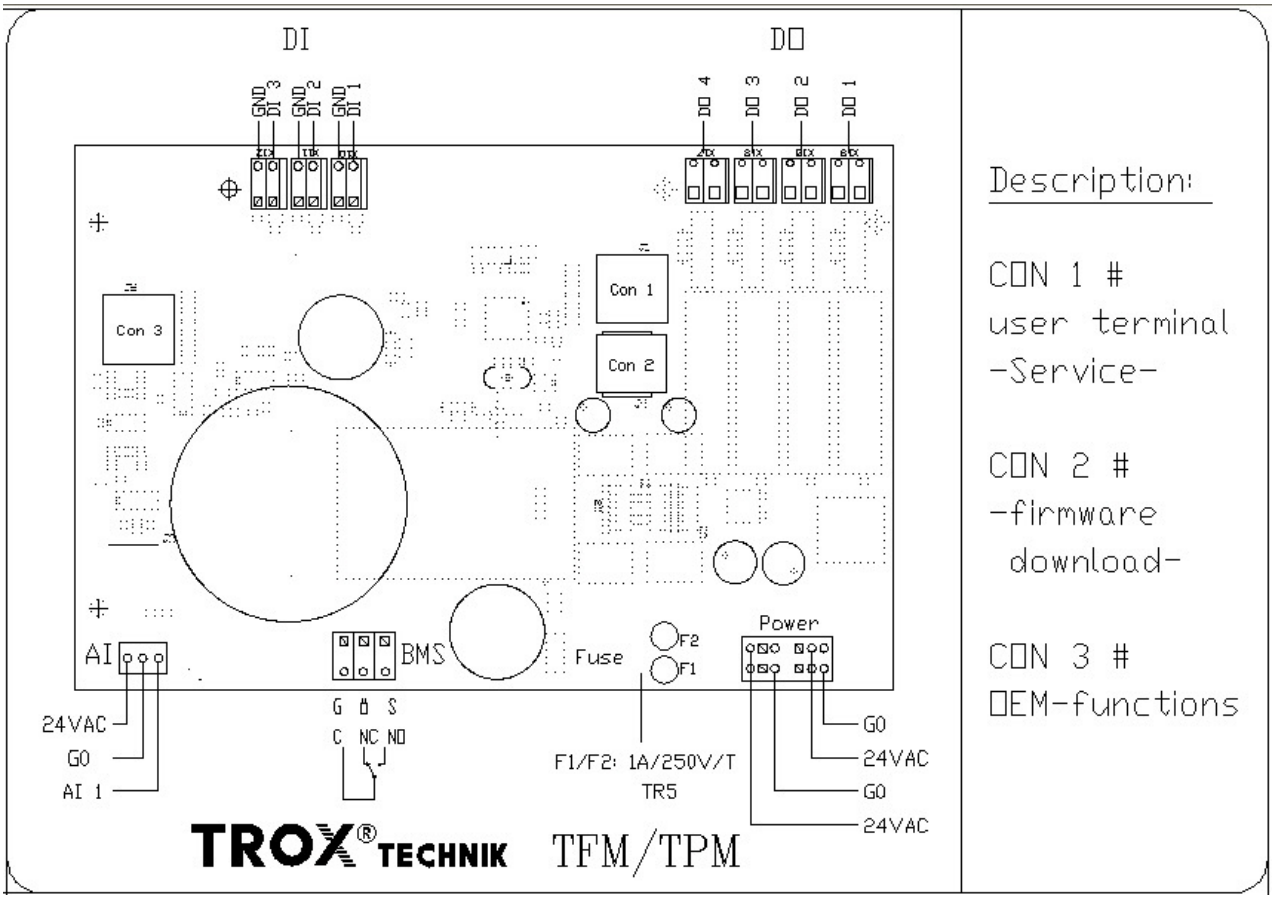
- BMS: Change-over contact for alarm transfer

## 6. Assignment of terminals TFM-1/2/TPM (Stickers in the unit cover)




3 Digital inputs (Identification: DI)

**TFM-1/2**

- DI 1: Changeover of the monitoring values
- DI 2: Sash window contact – 500mm
- DI 3: Monitoring activated/inactivated

**TPM**

- DI 1: Changeover of the monitoring values
- DI 2: Not used
- DI 3: Monitoring activated/inactivated (door contact)

5 Digital outputs (Identification: DO/BMS)

- DO 1: Light switch (TFM-1/TFM-2)
- DO 2: Not used
- DO 3: Open sash window (in association with AF-1)
- DO 4: Close sash window (in association with AF-1)

Operating device connections (Identification: CON1/CON2)

- CON1: Standard user terminal connection
- CON1/CON2: AF-1 user terminal connection

Analogue input (Identification: AI)

Scope for connection depending on the use of:

- Volume flow actual value signal
- External pressure adapter
- Air intake sensor

Power connection 24V AC (Identification: Power)

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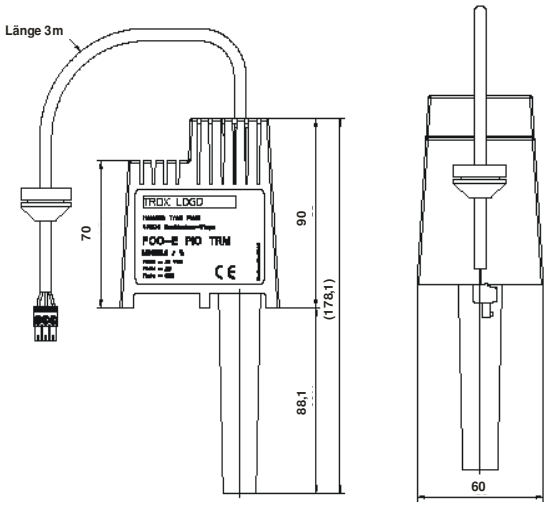
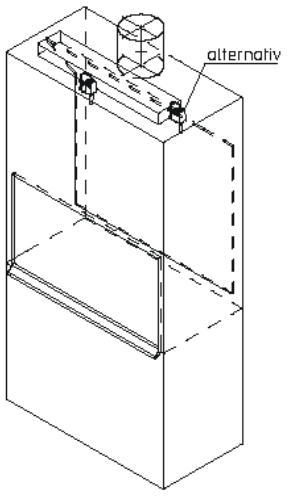
## 7. Velocity transmitter (optional)

Interacting with the TFM-2/TPM, the air intake sensor FCC-E-Pic TRM can be used.
With this combination an input velocity-related marginal value for monitoring can be laid down.

**Dimensions:**




**The best possible sensor position can be taken from the illustrations!**




## 8. Specifications

**Distribution voltage:**
24V AC +/- 15%, 50/60Hz

Double-decker terminal strip for looping
Plug-in terminals 0.5mm²–1.5mm² rigid and flexible

**Power consumption:**
3.5VA

**Temperature range:**
10–40C

**Inputs:**

1 analogue input 0–10V DC
Plug, threaded terminal end 0.14mm²–1.5mm² rigid and flexible

3 digital inputs for potential-free switch contacts
Plug-in terminals 0.5mm²–1.5mm² rigid and flexible

2 RJ sockets – 10-pole for connecting various user terminals (standard or optional AF-1)

**Outputs:**

1 digital alarm output (change-over contact)
Plug-in terminals 0.5mm²–1.5mm² rigid and flexible

3 digital outputs (closers)
Plug-in terminals 0.5mm²–1.5mm² rigid.

**Type of protection:**
IP 20

**Housing:**
Steel sheet housing with quick-release fasteners for the central monitoring unit.

## 9. Specification text – TFM-1

### TFM-1

Fume cupboard monitoring device for monitoring the aerodynamic function of fume cupboards, autonomously acting, with static differential pressure transmitter, secure power supply using capacitor, visual and acoustic alarm given when an inadmissible deviation from a set marginal value occurs. Alarm state can be read by means of a potential-free contact (change-over contact). A differential pressure measuring rod contained in the scope of supply detects the actual volume flow. Two volume flows can be monitored and a night-time operation (monitoring inactive) connected.
Suitable for installation into all types of laboratory extraction devices in accordance with EN14175.
Sash window contact with visual alarm and optional acoustic alarm.
A distinction is made between the set value being exceeded or undercut and this is indicated. Alarm messages in respect of the set value being undercut or exceeded can be handled in a variety of ways (alarm transfer, delay times, tolerances).
System data is saved in a fail-safe manner in the EEProm.

**Characteristics:**

- Free programming of all system data using LabMConnect adjusting software
- Service interval read-out
- Display of all set and actual values as well as diagnosis of system states
- Internal plausibility check
- Differential pressure range 5–250Pa
- If required, acoustic signal can be time-limited/deactivated
- Power failure display at the user terminal and alarm transfer to GLT
- 3 digital inputs (V1/V2, sash window contact, inactivation (night-time operation))
- 5 digital outputs

**User terminal standard:**
**Following visual displays:**

- Normal operation
- Alarm
- Volume flow too high
- Night-time operation
- Power failure

**Function keys:**

- Alarm acknowledgement
- Light switch

Optional AF-1 operating device with additional functions:

- Sash window closer operation OPEN/CLOSED
- Service LED
- Separate LED for sash window > 500mm

**Specifications:**

- Distribution voltage 24V AC +/-15%, 50/60Hz with double terminals for looping
- 1 analogue input 0–10V DC
- 3 digital inputs
- 1 digital output (change-over contact relay)
- 4 digital outputs (closer)
- Type of protection IP 20

**Make: TROX LABCONROL**
**Type: TFM-1**

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## 10. Specification text – TFM-2

## TFM-2

Fume cupboard monitoring device for monitoring the aerodynamic function of fume cupboards, autonomously acting, with static differential pressure transmitter, secure power supply using capacitor, visual and acoustic alarm given when an inadmissible deviation from a set marginal value occurs. Alarm state can be read by means of potential-free contact (change-over contact). The analogue input which is relayed with a VAV controller actual value output detects the actual volume flow. The input can be adjusted to all the usual volume flow or pressure linear signals. Two volume flows can be monitored and a night-time operation (monitoring inactive) connected.
Suitable for installation into all types of laboratory extraction devices in accordance with EN14175.
Sash window contact with visual alarm and optional acoustic alarm.
A distinction is made between the set value being exceeded or undercut and this is indicated. Alarm messages in respect of the set value being undercut or exceeded can be handled in a variety of ways (alarm transfer, delay times, tolerances).
System data is saved in a fail-safe manner in the EEProm.

**Characteristics:**

- Free programming of all system data using LabMConnect adjusting software
- Service interval read-out
- Display of all set and actual values as well as diagnosis of system states
- Internal plausibility check
- If required, acoustic signal can be time-limited/deactivated
- Power failure display at the user terminal and alarm transfer to GLT
- 3 digital inputs (V1/V2, sash window contact, inactivation (night-time operation))
- 5 digital outputs

**User terminal standard:**
**Following visual displays:**

- Normal operation
- Alarm
- Volume flow too high
- Night-time operation
- Power failure

**Function keys:**

- Alarm acknowledgement
- Light switch

Optional AF-1 operating device with additional functions:

- Sash window closer operation OPEN/CLOSED
- Service LED
- Separate LED for sash window > 500mm

**Specifications:**

- Distribution voltage 24V AC +/-15%, 50/60Hz with double terminals for looping
- 1 analogue input 0–10V DC
- 3 digital inputs
- 1 digital output (change-over contact relay)
- 4 digital outputs (closer)
- Type of protection IP 20

**Make: TROX LABCONROL**
**Type: TFM-2**

# 11. Specification text – TPM

## TPM

Room pressure monitoring device for monitoring correct adherence to the pressure conditions between various sections. Secure power supply using capacitor, visual and acoustic alarm given inadmissible deviation from a set marginal value. Alarm state can be read by means of potential-free contact (change-over contact). The analogue input, which is relayed with an actual value output of a room pressure transmitter/ring balance manometer, detects the actual pressure. The input can be adjusted to all the usual pressure-linear signals. Two room pressures can be monitored and a night-time operation/door contact (monitoring inactivation) connected. On using a door contact a timer is activated which, if required, signals and reports the fact that the door has been open for an inadmissibly long time.
A distinction is made between the set value being exceeded or undercut and this is indicated. Alarm messages in respect of the set value being undercut or exceeded can be handled in a variety of ways (alarm transfer, delay times, tolerances).
System data is saved in a fail-safe manner in the EEProm.

**Characteristics:**

- Free programming of all system data using LabMConnect adjusting software
- Door switch possible
- Display of all set and actual values as well as diagnosis of system states
- Internal plausibility check
- If required, acoustic signal can be time-limited/deactivated
- Power failure display at the user terminal and alarm transfer to GLT
- 2 digital inputs (deltaP1/deltaP2, inactivation (night-time operation))
- 5 digital outputs

**User terminal standard:**
**Following visual displays:**

- Normal operation
- Alarm
- Room pressure too high
- Door switch/night-time operation
- Power failure

**Function keys:**

- Alarm acknowledgement

**Specifications:**

- Distribution voltage 24V AC +/-15%, 50/60Hz with double terminals for looping
- 1 analogue input 0–10V DC
- 3 digital inputs
- 1 digital output (change-over contact relay)
- 4 digital outputs (closer)
- Type of protection IP 20

**Make: TROX LABCONROL**
**Type: TPM**

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